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Procedia - Social and Behavioral Sciences 187 (2015) 141 – 146

**Procedia**  
Social and Behavioral Sciences

PSIWORLD 2014

# The risk of eating disorders in adolescence and its association with the value of the body mass index, level of anxiety and level of depression

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## Abstract

The paper is aimed at studying whether there is any connection between the risk of developing an eating disorder in adolescence and the BMI, anxiety and depression. These connections are studied at a global level as well as making a differentiation between boys and girls. The results indicate that there is a positive correlation statistically significant of low intensity between the risk of developing an eating disorder and the BMI and that there is some positive correlations statistically significant and moderate between the risk of developing an eating disorder and the anxiety (viewed as a state and as a trait) and depression. When statistic analysis is performed making a differentiation between boys and girls, the results evidence that while in boys these correlations are not statistically relevant, they are in girls.

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Peer-review under responsibility of the Scientific Committee of PSIWORLD 2014.

**Keywords:** the risk of developing an eating disorder, BMI, anxiety, depression, adolescence

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## 1. Introduction

The subject of eating disorders had been addressed by a significant number of studies, however, the scientific literature draws attention to the existence of symptoms not reaching the critical level but which could have a strong impact. Makino, Tsuboi and Dennerstein (2006) show that Western adolescents, especially girls, may experience certain anomalies in their attitude towards food. Such anomalies are subclinical forms of eating disorders which

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may be influenced by certain aspects of the lifestyle, such as alcohol and tobacco consumption or the environment in which the teenagers live. A study carried out by Sepulveda, Carrobbles and Gandrillas (2008) evidences that when it comes to teenager students, girls show health threatening behaviours, such as: dieting, use of laxatives, vomit induction. 6% of such girls have a BMI of 17.5 or lower, while 2.5% of them show amenorrhea in the past 3 months. As for the boys, they had an increased risk of compulsive eating.

Ackard et al.(2011) show that among teenagers which have not been diagnosed with an eating disorder in a clinical context, but who show symptoms of an eating disorder, the following may be observed in comparison with the asymptomatic teenagers: lower self-esteem, more frequent substance abuse, depression, suicidal thoughts and even more frequent suicide attempts. Rasmus et al. (2010) have tried to study the risk of eating disorders in the case of teenagers on diets. The authors discovered four groups of teenagers habitually dieting: those who are on a diet out of vanity, those who go on diets because they are overweight, those who go on diets and are depressive and those who go on diets because they feel they have a few extra kilos. It was discovered that the groups of depressive dieting teenagers and the group of those dieting because they felt they had extra kilos presented a risk of developing an eating disorder 15 times higher than those who were dieting out of vanity or because they were indeed overweight. The prevalence of teenagers with increased risk of developing an eating disorder was 14.9% in the case of men and 20.8% in the case of women. Thus, the results of the study showed that there was a statistically significant gender difference from this point of view (Sepulveda, Carrobbles and Gandrillas, 2008).

The anxiety and depression may appear in adolescence and may be associated with an eating disorder or with an increased risk of developing such and sometimes this risk is higher in those who have a higher body mass. Skrove, Romndstad and Inredavik (2013) report that 13% of adolescents experimenting depression or anxiety symptoms. Veses et al. (2014) show that overweight teenagers (the researchers have included in this category also obese adolescents) have a higher risk of developing an eating disorder than the non-overweight adolescents. Among the overweight and obese youngsters there are high values of depression, anxious disorders, ADHD and ODD, as noted by Pauli-Pott et al. (2013). Russo et al. (2011) show that among the obese and overweight adolescents searching for treatment, those with a lower self-esteem and who show symptoms of depression and anxiety have an increased risk of developing an eating disorder. Huh et al. (2012) show that the transition from middle adolescence to late adolescence is the period with the highest risk in the case of obesity in women. The study also shows that the African-American and Latin-American women show an increased risk of obesity and overweight than the European women in adolescence.

Anxiety and depression are strongly correlated, but it cannot be ascertained which of these appears first. Hence, it seems that in the period since childhood and until early adolescence anxiety precedes depression, while starting with late adolescence both variants are possible, meaning it is possible that anxiety precedes depression or that depression precedes anxiety (Maughan, Collishaw & Stringaris, 2013). Cummings, Caporino and Kendal (2014) underline the comorbidity between anxiety and depression in teenagers and describe three possible directions of evolution of such comorbidity. A first model describes youngsters prone to anxiety, with a subsequent appearance of depression, resulted as deterioration caused by anxiety. A second pattern refers to youngsters with a double predisposition, for both anxiety and depression, who could experience both disorders at the same time. The third model describes youngsters prone to depression, in which the anxiety appears at a later stage, as the result of deterioration caused by depression. The authors show the fact that the first pattern could be specific to adolescents experiencing social phobia or separation anxiety, the second pattern to youngsters experiencing anxiety generalized in comorbidity with depression and the third pattern would be specific to youngsters with depression who then develop a social phobia.

## **2. Objectives and Hypotheses**

The research is aimed at studying whether there is a connection between the risk of developing an eating disorder in adolescence and the level of the BMI, the intensity of the anxious symptoms, the intensity of the depressive symptoms. These connections have been studied at a global level as well as making a differentiation between boys and girls.

## **3.Method**

### 3.1. Participants

The sample group consisted of 119 adolescents, of which 32 boys and 87 girls, with ages between 15 and 19. The data were collected in the high school attended by the students participating in the study.

### 3.2. Instruments

In order to evaluate the risk of developing an eating disorder, the EAT 26 instrument (The Eating Attitude Test-26) has been used. The BMI has been calculated according to the subjects' height and weight. The anxious symptoms have been evaluated with STAI (State-Trait Anxiety Inventory). The depressive symptoms have been evaluated with BDI (Beck Depression Inventory).

### 3.3. Procedure

The research pattern is a correlational one, the variable of the risk of developing an eating disorder being correlated with the value of the BMI, the level of the anxiety as a mood and as a trait and the level of depression. The same correlations were performed by differentiating between girls and boys.

## 3. Results

A descriptive analysis of the category in which each adolescent may be included according to their age and BMI was made. The subjects have been included in categories based on the suggestions provided by World Health Organization (2007). The data gathered from this sample group indicated that none of the 119 subjects (100%) presents signs of severe underweight, one (0.8%) is underweight, 109 (91.6%) have a normal weight, 9 (7.6%) are overweight and none is obese.

For the descriptive analysis regarding the presence of anxious symptoms, the cut-off values mentioned by Tominaga et al. (2007) were used. The relevant descriptive statistical analysis shows that in case of anxiety as a mood, from the 119 subjects (100%), 83 subjects (69.7%) have a low anxiety level and 36 subjects (30.3%) have an increased anxiety level. In the case of anxiety as a trait, 56 subjects (47.1%) have a low anxiety level, while 63 subjects (52.9%) have an increased anxiety level.

In the case of measuring the depression level for including the subjects in one of the four categories, the cut-off values recommended by Tudose, Tudose and Dobranici (2011) were used. The research data evidence that from 119 subjects (100%), 70 subjects (58.8%) do not present significant depressive symptoms, 29 (24.4%) register a mild depression, 14 (11.8%) register a moderate depression and 6 (5.0%) register severe depression.

Regarding the descriptive statistic indicators of the study's variables, they are shown in Table 1.

Table 1. Descriptive statistic indicators for the research variables

Variable	Mean	Confidence interval limits	Median	Variance	Standard deviation
Risk of eating disorder	12.64	10.95-14.32	11.00	85.39	9.24
BMI	20.54	20.06-21.01	20.31	6.75	2.59
Anxiety as a state	39.97	38.07-41.86	38.00	107.70	10.37
Anxiety as a trait	45.22	43.55-46.89	45.00	83.81	9.15
Depression	9.86	8.60-11.13	8.00	48.15	6.93

The results of the research indicate the existence of a statistically significant positive low intensity correlation between the risk of developing an eating disorder and BMI ( $r=0.19$ ,  $df=117$ ,  $p<0.05$ ), with a moderate intensity in girls, while such correlation is not statistically significant in boys. The connection between the risk of developing an eating disorder and the anxiety as state is positive, statistically significant and moderate ( $r=0.31$ ,  $df=117$ ,  $p<0.01$ ) In girls the correlation is statistically significant of low intensity while in boys the correlation is not statistically significant. Regarding the association between the risk of developing an eating disorder and anxiety as a trait, the

research data evidence that such is statistically significant, positive and moderate ( $r=0.30, df=117, p<0.01$ ). In girls, the association is statistically significant, positive, of low intensity while in boys it is not statistically significant. The correlation between the risk of developing an eating disorder and depression is a positive correlation, statistically significant and moderate ( $r= 0.30, df=117, p<0.01$ ), in girls being statistically significant and low and in boys being not statistically significant. Table 2 presents the values of the Pearson's correlation coefficient and the statistical significance for the correlations achieved differentially in girls and in boys.

Table 2. The values of  $r$  and  $p$  for the correlations achieved differentially in girls and in boys

The variable with which was correlated the risk to develop an eating disorder	Gender	$r$	$p$
IMC	male	0.22	0.21
	female	0.33	0.002
Anxiety as a state	male	0.18	0.300
	female	0.28	0.007
Anxiety as a trait	male	0.29	0.100
	female	0.19	0.050
Depression	male	0.24	0.180
	female	0.22	0.030

#### 4. Conclusions

The results of the study evidence that the teenagers from the study sample tend to have a normal weight for their age and height. Regarding the descriptive analysis of the levels of anxiety and depression in adolescence, the research data indicate such levels having high values. These levels may be considered worrying and they draw attention to the necessity of investigating these aspects in relation to teenagers. They also highlight the importance of programs for detecting teenagers with an increased risk from this perspective and the necessity of including such teenagers in programs to help them better managing the difficulties they are confronted with and the emotions, aspects mentioned also by Bearman and Stice (2008). A prevention program in line with the above is described by Rasing et al. (2013); Gonzales et al. (2011) present a program of prevention of eating disorders in teenagers, program developed within the schools they studied in.

Also, the research evidences the existence of significant correlations between the risk of developing an eating disorder, the BMI level, the level of anxiety and the level of depression, indicating the fact that these correlations have statistic significances and different intensities in girls and boys. Thus, in boys they are not statistically significant, while in girls they are. These data draw attention to future investigations of aspects related to the risk of developing an eating disorder, since it is possible that between girls and boys there are significant differences in this respect. Such differences have theoretical and practical implications due to the fact that different explanatory models according to the gender can be conceived. Also, different prevention methods and interventions can be applied.

Although the Pearson correlation does not offer the possibility to interpret the conclusions from a cause and effect link point of view, we should consider a psychological interpretation of such results. Thus, it is possible that women, once they have a high BMI, feel pressured to a greater extent than men to lose weight, having a lower satisfaction in relation to their own body, to this extent exposing them to an increased risk of developing eating disorders. Also, statistically significant correlations have been evidenced between the level of depression and of anxiety and the risk of eating disorders in girls but not in boys. This explanation is in line with the pattern presented by Vaughan and Halpern (2010), which is a continuation of the gender additive model proposed by Bearman and Stice (2008). This model indicates that the image of one's own body and the variables related to one's diet habits represent predicting factors of depression in girls, but not in boys. Chaiton et al. (2009) evidence the existence of the correlation between adiposity, corporal satisfaction, the pressure to be thin and the depressive symptoms in adolescence.

The study presents a series of limitations. A first limit is related to the volume of the sample group. Thus, in the future, similar research could be performed considering a higher number of subjects. Another limit refers to the

significant difference between the size of the female sample group and that of the male sample group. In the future, studies looking in depth at the aspects related to eating disorders and the way they connect differently with anxiety, depression and body mass in boys and girls could be performed. Such studies could also aim at testing the differences between boys and girls in this respect. Moreover, research in this field could be extended to other age groups such as preadolescents and youngsters who moved past adolescence and testing the existence of some differences between these groups would be important. Another limitation of the study resides in the traits of the subjects who are mainly adolescents with a normal weight. Future studies could aim at testing the hypothesis of this study on teenagers groups with a normal weight, who are overweight or underweight. In addition to this, it could also investigate differences between these groups of teenagers. Also, the adolescents within this research attend a high school where girls' attendance is higher than boys' attendance which could be connected with the image the adolescents form in relation to their body. For this reason future studies could consider also this aspect. Also, the study did not take into consideration the variable which refers to the body satisfaction, so further research could investigate this aspect and its connection with the variables included in the present research, as well as a possible role of moderator in the relationship between the risk of eating disorders and the anxiety and depression.

## Acknowledgements

The author of this study is thankful to prof. dr. Laurentiu Mitrofan for the coordination of the dissertation thesis of which the present paper was part of.

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